

WHAT IS CLAIMED IS:

1. A reactive polymer comprising a non-terminal monomeric unit comprising a pendant ethylenically unsaturated group and copolymerized N-isopropylacrylamide.
2. The reactive polymer of claim 1 wherein the pendant ethylenically unsaturated group comprises a (meth)acrylate group.
3. A reactive polymer comprising:
1% by weight to 90% by weight of non-terminal monomeric units comprising a pendant ethylenically unsaturated group, based on the total weight of monomeric units; and
1% by weight to 99% by weight of copolymerized N-isopropylacrylamide, based on the total weight of monomeric units.
4. The reactive polymer of claim 3 comprising:
5% by weight to 50% by weight of non-terminal monomeric units comprising a pendant ethylenically unsaturated group, based on the total weight of monomeric units; and
50% by weight to 95% by weight of copolymerized N-isopropylacrylamide, based on the total weight of monomeric units.
5. The reactive polymer of claim 4 comprising:
10% by weight to 30% by weight of non-terminal monomeric units comprising a pendant ethylenically unsaturated group, based on the total weight of monomeric units; and
70% by weight to 90% by weight of copolymerized N-isopropylacrylamide, based on the total weight of monomeric units.

6. A reactive polymer comprising a polymeric backbone having at least three ethylenically unsaturated pendant groups and a plurality of pendant groups of the formula $\text{-C(O)NHCH(CH}_3)_2$ attached to the backbone.
7. The reactive polymer of claim 6 wherein the ethylenically unsaturated pendant groups comprise (meth)acrylate groups.
8. A method of preparing a reactive polymer comprising:
copolymerizing monomers comprising N-isopropylacrylamide and a hydroxy-functional (meth)acrylate monomer to form a hydroxy-functional polymer; and
reacting the hydroxy-functional polymer with a hydroxy-reactive material selected from the group consisting of a (meth)acrylate-functional isocyanate, a (meth)acrylate-functional epoxide, a vinyl azlactone, and combinations thereof.
9. The method of claim 8 wherein the hydroxy-reactive material is selected from the group consisting of 2-isocyanatoethyl methacrylate, 4,4-dimethyl-2-vinyl-2-oxazolin-5-one, and combinations thereof.
10. The method of claim 8 wherein the monomers further comprise acrylamide.
11. A method of preparing a reactive polymer comprising:
copolymerizing monomers comprising N-isopropylacrylamide and vinyl azlactone to form an azlactone-functional polymer; and
reacting the azlactone-functional polymer with a hydroxy-functional (meth)acrylate.
12. The method of claim 11 wherein the azlactone is 4,4-dimethyl-2-vinyl-2-oxazolin-5-one.

13. The method of claim 11 wherein the hydroxy-functional (meth)acrylate is 2-hydroxyethyl methacrylate.
14. The method of claim 11 wherein the monomers further comprise acrylamide.
15. A dental composition suitable for use in the oral environment comprising:
a polymer comprising polymerized N-isopropylacrylamide; and
a dental additive.
16. The dental composition of claim 15 wherein the dental additive is selected from the group consisting of fluoride sources, whitening agents, anticaries agents (e.g., xylitol), remineralizing agents (e.g., calcium phosphate compounds), enzymes, breath fresheners, anesthetics, clotting agents, acid neutralizers, chemotherapeutic agents, immune response modifiers, medicaments, indicators, dyes, pigments, wetting agents, surfactants, buffering agents, viscosity modifiers, thixotropes, fillers, polyols, antimicrobial agents, antifungal agents, stabilizers, agents for treating xerostomia, desensitizers, and combinations thereof.
17. The dental composition of claim 15 wherein the dental additive is a tooth whitening agent selected from the group consisting of hypochlorites, peroxides, hydroperoxides, hydrogen peroxide, peracids, carbamide peroxides, and combinations thereof.
18. The dental composition of claim 15 wherein the dental composition is in a form selected from the group consisting of a dispersion, a suspension, an emulsion, a solution, and combinations thereof.
19. The dental composition of claim 15 wherein the composition is an aqueous composition.

20. The dental composition of claim 19 wherein the composition is thermally responsive.
21. The dental composition of claim 15 further comprising a polymerizable component.
22. The dental composition of claim 21 wherein the polymerizable component is selected from the group consisting of an ethylenically unsaturated compound, a glass ionomer cement, and combinations thereof.
23. The dental composition of claim 21 wherein the polymerizable component is a free radically polymerizable compound.
24. A composition comprising:
a reactive polymer comprising a non-terminal monomeric unit comprising a pendant ethylenically unsaturated group and copolymerized N-isopropylacrylamide; and
water.
25. The composition of claim 24 wherein the composition is thermally responsive.
26. The composition of claim 24 wherein the composition is suitable for use in the oral environment.
27. The composition of claim 24 wherein the pendant ethylenically unsaturated group comprises a (meth)acrylate group.
28. The composition of claim 24 further comprising an initiator.
29. The composition of claim 28 wherein the initiator is a photoinitiator.

30. The composition of claim 28 wherein the initiator is a free radical initiator.
31. The composition of claim 24 further comprising an oxidizing agent and a reducing agent.
32. The composition of claim 24 further comprising a polymerizable component different than the reactive polymer.
33. A composition comprising:
1% by weight to 99% by weight of a reactive polymer comprising a non-terminal monomeric unit comprising a pendant ethylenically unsaturated group and copolymerized N-isopropylacrylamide, based on the total weight of the dental composition; and
water.
34. A method of treating an oral surface comprising:
applying a thermally responsive composition in a low viscosity state at a pre-treatment temperature to the oral surface, the composition comprising water and a polymer comprising polymerized N-isopropylacrylamide; and
allowing the composition to warm to a treatment temperature and exhibit a thermal response.
35. The method of claim 34 wherein the thermal response is selected from the group consisting of gelation, phase separation, and combinations thereof.
36. The method of claim 34 wherein the composition further comprises a dental additive.
37. The method of claim 36 wherein the dental additive is selected from the group consisting of fluoride sources, whitening agents, anticaries agents (e.g.,

xylitol), remineralizing agents (e.g., calcium phosphate compounds), enzymes, breath fresheners, anesthetics, clotting agents, acid neutralizers, chemotherapeutic agents, immune response modifiers, medicaments, indicators, dyes, pigments, wetting agents, surfactants, buffering agents, viscosity modifiers, thixotropes, fillers, polyols, antimicrobial agents, antifungal agents, stabilizers, agents for treating xerostomia, desensitizers, and combinations thereof.

38. The method of claim 36 wherein the dental additive is a tooth whitening agent selected from the group consisting of hypochlorites, peroxides, hydroperoxides, hydrogen peroxide, peracids, carbamide peroxides, and combinations thereof.

39. The method of claim 34 wherein applying the composition comprises delivering the composition through an orifice.

40. The method of claim 39 wherein the orifice is the orifice of a syringe.

41. The method of claim 34 wherein applying the composition is selected from the group consisting of painting the composition, brushing the composition, syringing the composition, misting the composition, spraying the composition, applying a substrate having the composition thereon, and combinations thereof.

42. The method of claim 34 wherein the pre-treatment temperature is at most room temperature.

43. The method of claim 34 wherein the treatment temperature is body temperature.

44. A method of hardening a composition on a surface comprising:
applying a thermally responsive composition in a low viscosity state at a pre-treatment temperature to the surface, the composition comprising water and

a reactive thermally responsive viscosity modifier comprising a polymer comprising a non-terminal monomeric unit comprising a pendant ethylenically unsaturated group and copolymerized N-isopropylacrylamide;
allowing the composition to warm to a treatment temperature and exhibit a thermal response; and
inducing the reactive thermally responsive viscosity modifier to react.

45. The method of claim 44 wherein the composition further comprises an initiator.

46. The method of claim 45 wherein the initiator is a photoinitiator.

47. The method of claim 45 wherein the initiator is a free radical initiator.

48. The method of claim 44 wherein the composition further comprises an oxidizing agent and a reducing agent.

49. The method of claim 44 wherein inducing reaction comprises irradiating the composition.

50. The method of claim 49 wherein irradiating comprises irradiating the composition with visible or ultraviolet light.

51. The method of claim 44 wherein inducing reaction comprises introducing one or more additional components.

52. The method of claim 44 wherein the thermally responsive composition comprises two or more parts, and wherein applying the composition comprises combining the two or more parts.

53. The method of claim 52 wherein combining comprises using a static mixing device.

54. The method of claim 44 wherein the surface is a surface of a body.
55. The method of claim 54 wherein the surface of the body is an oral surface.
56. The method of claim 55 wherein the oral surface is selected from the group consisting of bone, tooth, tongue, gingiva, throat, and combinations thereof.
57. A thermally responsive composition comprising:
a polymer comprising polymerized N-isopropylacrylamide;
a polymerizable component different than the polymer; and
water.
58. A method of preparing a hardened composition on a surface comprising:
applying a thermally responsive composition in a low viscosity state at a pre-treatment temperature to the surface, the composition comprising:
a polymer comprising polymerized N-isopropylacrylamide;
a polymerizable component different than the polymer; and
water;
allowing the composition to warm to a treatment temperature; and
inducing the polymerizable component to polymerize.